Cite abstracts as **Author(s) (2010), Title, *Eos Trans. AGU*, *91*(26), Ocean Sci. Meet. Suppl., Abstract xxxxx-xx**

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0830h
PO51C-03

Assessment of Current Estimates of Global and Regional Mean Sea Level from the TOPEX/Poseidon, Jason-1, and OSTM 17-Year Record

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The science value of satellite altimeter observations has grown dramatically over time as enabling models and technologies have increased the value of data acquired on both past and present missions. With the prospect of an observational time series extending into several decades from TOPEX/Poseidon through Jason-1 and the Ocean Surface Topography Mission (OSTM), and further in time with a future set of operational altimeters, researchers are pushing the bounds of current technology and modeling capability in order to monitor global sea level rate at an accuracy of a few tenths of a mm/yr. The measurement of mean sea-level change from satellite altimetry requires an extreme stability of the altimeter measurement

system since the signal being measured is at the level of a few mm/yr. This means that the orbit and reference frame within which the altimeter measurements are situated, and the associated altimeter corrections, must be stable and accurate enough to permit a robust MSL estimate. Foremost, orbit quality and consistency are critical to satellite altimeter measurement accuracy. The orbit defines the altimeter reference frame, and orbit error directly affects the altimeter measurement. Orbit error remains a major component in the error budget of all past and present altimeter missions. For example, inconsistencies in the ITRF used to produce the precision orbits at different times cause systematic inconsistencies to appear in the multi-mission time-frame between TOPEX and Jason-1, and can affect the intermission calibration of these data. In an effort to adhere to cross mission consistency, we have generated the full time series of orbits for TOPEX/Poseidon (TP), Jason-1, and OSTM based on recent improvements in the satellite force models, reference systems, and modeling strategies. The recent release of the entire revised Jason-1 Geophysical Data Records, and recalibration of the microwave radiometer correction also require the further re-examination of inter-mission consistency issues. Here we present an assessment of these recent improvements to the accuracy of the 17-year sea surface height time series, and evaluate the subsequent impact on global and regional mean sea level estimates.

[1229] GEODESY AND GRAVITY / Reference systems

[4556] OCEANOGRAPHY: PHYSICAL / Sea level: variations and mean

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